Research Design

Contributors
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Design Characteristics

- Maximizes control over factors to increase the validity of the findings

- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality
A \rightarrow B
Pressure \rightarrow Ulcer

Multicausality
Years smoking \rightarrow Heart disease
High fat diet \rightarrow Heart disease
Limited exercise \rightarrow Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

• Measure of accuracy of a study

• Examined with critique of the following dimensions:
  o Statistical conclusion validity
  o Internal validity
  o Construct validity
  o External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- **Controlling the treatment**
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- **Controlling extraneous variables**
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?

No

Is the primary purpose examination of relationships?

No

Descriptive Design

Will the sample be studied as a single group?

No

Correlational Design

Yes

Quasi-Experimental Study

No

Is the treatment tightly controlled by the researcher?

No

Yes

Will a randomly assigned control group be used

No

Is the original sample randomly selected?

No

Yes

Experimental Study
A Typical Descriptive Design

Clarification  ➔ Measurement  ➔ Description  ➔ Interpretation

Phenomenon of Interest

Variable 1

Variable 2

Variable 3

Variable 4

Description of Variable 1

Description of Variable 2

Description of Variable 3

Description of Variable 4

Interpretation of Meaning

Development of Hypotheses
A Comparative Descriptive Design

Group I
{variables measured}

Describe

Comparison of Groups on Selected Variables

Interpretation of Meaning

Group II
{variables measured}

Describe

Development of Hypotheses
Selecting the Type of Correlational Design

- Describe relationships between/among variables?
  - Descriptive correlational design

- Predict relationships between/among variables?
  - Predictive correlational design

- Test theoretically proposed Relationships?
  - Model testing design

Research Design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Interpretation of Meaning

Description of variable

Research Variable 2

Development of Hypotheses

Research Design
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

1. Control Group?
   - No
     - Pretest?
       - No
         - One-group post-test only design
       - Yes
         - Repeated Measures?
           - No
             - Strategy for Comparison
               - No
                 - Suggest Reevaluating design
               - Yes
                 - Compare treatment & control conditions?
           - Yes
             - Repeated Measures?
Selecting The Type of Experimental Design

- **Pretest**
  - No
    - Post-test only control group design
  - Yes
    - Repeated Measurements?
      - No
        - Examine effects of confounding variables?
          - No
            - Multiple sites?
              - No
                - Pretest/post-test control group design
              - Yes
                - Randomized clinical trials
    - Yes
      - Repeated measures design
        - Blocking?
          - No
            - Comparison of multiple levels of treatment
              - No
                - Examination of complex relationships among variables in relation to treatment
              - Yes
                - Nested Designs
          - Yes
            - Randomized Block Design
## Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>PRETEST</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td></td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

- **Measurement of dependent variables**
- **Manipulation of independent variables**
- **Measurement of dependent variables**

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:**
Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation:**
- Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Randomly selected control group</th>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TREATMENT</td>
<td>POST-TEST</td>
</tr>
<tr>
<td></td>
<td></td>
<td>POST-TEST</td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:** Comparison of experimental and control groups


**Uncontrolled threats to validity:**
- Instrumentation
- Mortality
- Limited generalizability as control increases
<table>
<thead>
<tr>
<th>Pain Control Management</th>
<th>Primary Nursing Care</th>
<th>Primary Care</th>
<th>No Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional care</td>
<td>Unit A</td>
<td>Unit B</td>
<td>Unit C</td>
</tr>
<tr>
<td>PRN Medication</td>
<td>Unit B</td>
<td></td>
<td>Unit C</td>
</tr>
<tr>
<td>New approach: “Around the clock” medication</td>
<td>Unit C</td>
<td>Unit D</td>
<td></td>
</tr>
</tbody>
</table>

New approach: “Around the clock” medication
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically
- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design